

Daikin AC Comments to CEC

Typical Combined Hydronics versus
Daikin Altherma (Air to Water HP
systems)

CEC Title-24 – Definition of “Combined Hydronics”

5.4.3 Combined Hydronic

Combined hydronic space heating systems utilize a single heat source to provide both space heating and domestic hot water. The system is evaluated for water heating performance as if the space heating function were separate. Section 4.7 provides an explanation of combined hydronic systems.

A “combined hydronic” system is another compliance option that is possible when using the performance method. Combined hydronic heating refers to the use of a single water heating device as the heat source for both space and domestic hot water heating.

There are two types of combined hydronic systems. One uses a boiler as a heat source for the hydronic space heating system. The boiler also heats domestic water by circulating hot water through a heat exchanger in an indirect-fired water heater.

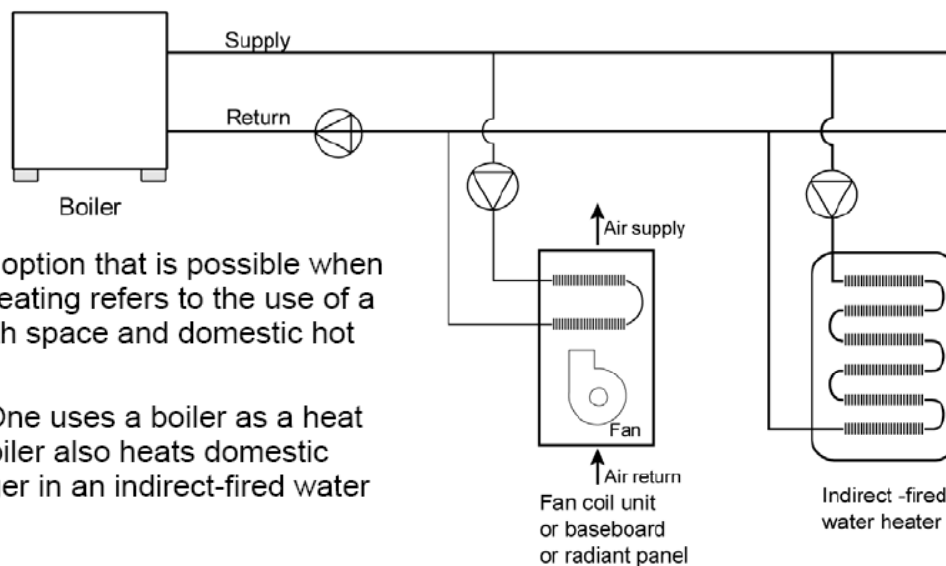


Figure 4-27 – Combined Hydronic System with Boiler and Indirect Fired Water Heater

CEC Title-24 – Definition of “Combined Hydronics”

The other type of hydronic heating uses a water heater as a heat source. The water heater provides domestic hot water as usual. Space heating is accomplished by circulating water from the water heater through the space heating delivery system. Sometimes a heat exchanger is used to isolate potable water from the water circulated through the delivery system. Some water heaters have built-in heat exchangers for this purpose.

For compliance calculations, the water heating function of a combined hydronic system is analyzed for its water heating performance as if the space heating function were separate. For the space heating function, an “effective” AFUE or HSPF rating is calculated. These calculations are performed automatically by the compliance software (see the compliance program vendor’s supplement).

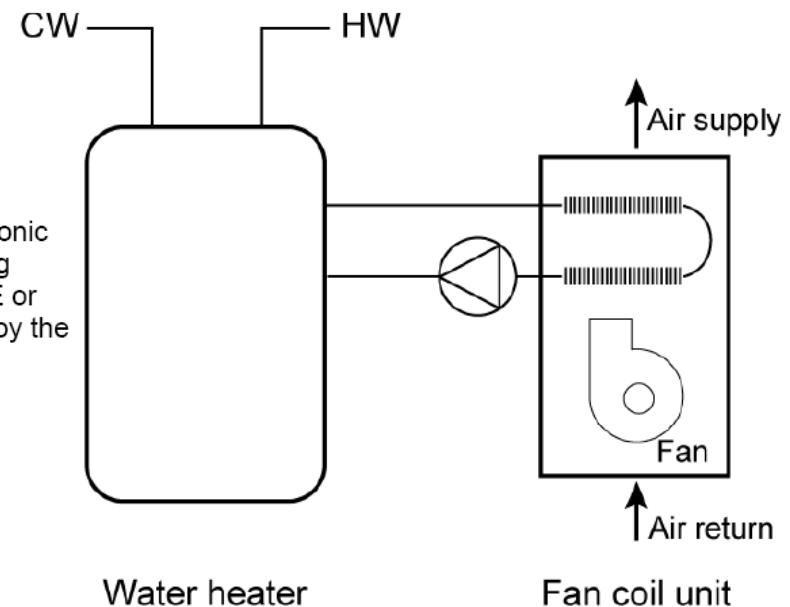


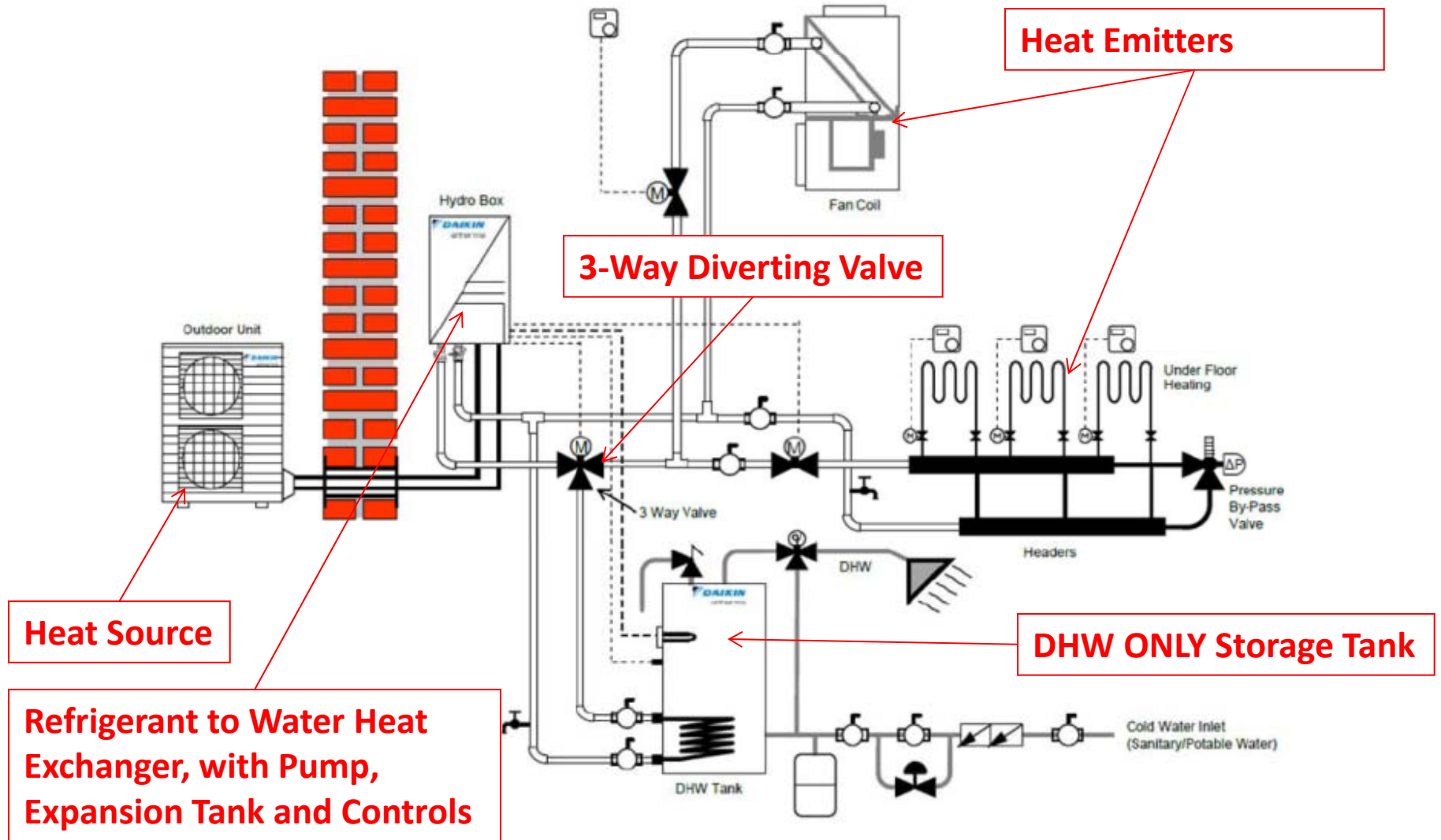
Figure 4-26 – Combined Hydronic System with Water Heater as Heat Source

Key Points to note regarding Combined Hydronics

- These systems typically use a heat source and indirect tank to store heat energy for Space Heating and DHW needs.
- Current CEC procedure references “stand-by” losses for Water Heating (Section 5 of Compliance Manual) but only references that “impacts must be considered in selecting a water heater”
- For compliance purposes, combined systems treat space heating as a separate entity and thus an effective AFUE or HSPF is CALCULATED.

Clarification of “Daikin Altherma” (Air to Water HP) as Combined Hydronic System

Daikin Altherma Split System



Clarification of “Daikin Altherma” (Air to Water HP) as Combined Hydronic System

- Altherma in Heating Mode: -
 - 3-Way Valve IS NOT energized. Hot Water generated via the Refrigerant to Water Heat Exchange is transferred directly to zones calling for heat. No “Stand By” losses need to be considered.
 - Efficiency is driven by Energy Consumption versus Heat Energy created, thus COP is valid metric.
 - To determine HSPF, standard calculation used for WSHP is utilized to convert COP to HSPF value.

Clarification of “Daikin Altherma” (Air to Water HP) as Combined Hydronic System

- Altherma in “DHW” Mode: -
 - 3-Way Valve IS energized. Hot Water generated via the Refrigerant to Water Heat Exchange is transferred to the Indirect Tank to heat the water in the storage tank. Per federal test standards for EWH and HPWH, no “Stand By” losses need to be considered.
 - Efficiency is driven by Energy Consumption versus Heat Energy created, thus COP is valid metric.
 - To reflect industry norm for Water Heating efficiency (i.e. E.F. rating), the COP attained in an equivalent condition to federal test standards are utilized to determine an equivalent E.F. rating.

Clarification of “Daikin Altherma” (Air to Water HP) as Combined Hydronic System

- General Notes: -
 - Daikin Altherma never operates in its Heat Pump mode to simultaneously meet Space Heating and DHW loads. The system is an either/or solution.
 - The same situation is the case in the Cooling season, where by meeting Space Cooling and DHW loads are addressed separately – not simultaneously.
 - Insulation requirements etc for the DHW storage tank are addressed with separate requirements in the Title 24 Compliance Manual.